

Topline Report

From a Study
Conducted by

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For the
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THE ECONOMIC COSTS OF PHYSICAL INACTIVITY, OBESITY, AND OVERWEIGHT IN CALIFORNIA ADULTS:

Health Care, Workers' Compensation, and Lost Productivity



EXECUTIVE SUMMARY

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Obesity as a Costly Epidemic

Obesity is emerging as the defining disease of our age.¹ The Centers for Disease Control and Prevention (CDC) Director Julie Gerberding M.D., M.P.H., testified to Congress that rapid increases in obesity rates and the costs of related diseases no longer permit the nation to ignore obesity as a public health problem. She explained that the speed of its spread is due to a myriad of social changes that combined to increase caloric intake and reduce physical activity.² Subsequently, CDC estimated obesity-attributable health care costs at \$75 billion, of which about half was publicly financed. They attributed approximately 6 percent of all adult health care, 7 percent of Medicare, and 11 percent of Medicaid expenditures to obesity.³

Trends in California

Over the last decade, California has experienced one of the fastest rates of increase in adult obesity of any state in the nation.⁴ More than half of California adults now are overweight or already obese. Rates among African American and Latino adults, men over age 25 years, and adults with less than a high school education exceed 60 percent. Rates of physical activity and healthy eating have not improved significantly, and there is no sign that the increases in overweight or obesity are slowing.⁵

Study Description

In Spring 2001, the California Department of Health Services (DHS) contracted with the Public Health Institute and Health Management

Associates (HMA), a division of Chenoweth & Associates, Inc., to provide the most complete estimate possible of the California-specific costs of physical inactivity, obesity, and overweight. (At the time, there was no econometric model that included poor diet as a risk factor or its additional costs independent of the other three risk factors.) The appraisal included relevant medical care conditions, workers' compensation costs, and lost productivity outcome measures associated with the three risk factors. Data from the 1998 California Behavioral Risk Factor Survey (BRFS) were used to identify the prevalence of physical inactivity, and data from the 1999 California BRFS were used to identify prevalence of overweight and obesity.

Findings

The HMA study revealed that, in year 2000 dollars, physical inactivity, obesity, and overweight cost California an estimated \$21.7 billion a year in direct and indirect medical care (\$10.2 billion), workers' compensation (\$338 million), and lost productivity (\$11.2 billion).⁶ The annual costs of physical inactivity were estimated at \$13.3 billion, obesity at \$6.4 billion, and overweight at \$2.0 billion. The majority of these costs were shouldered by public and private employers in the form of health insurance and lost productivity. The study projected that these costs would rise to more than \$28 billion in 2005 unless aggressive action was taken.

"How can California reverse the obesity epidemic when the environment makes it so hard? We need to involve many stakeholders — agriculture, public health, education, business, transportation, media, policymakers, and others — so that healthy eating and physical activity become the easy choices for Californians."

**Richard Joseph Jackson, MD, MPH
California State Public Health Officer**

The HMA study also estimated that a five percent improvement in the rates of physical activity and healthy weight over five years could save more than \$6 billion, while a ten percent improvement could save nearly \$13 billion. That is, if 1 or 2 Californians out of every 20 who are overweight



or inactive were to reduce their Body Mass Index (BMI) to a leaner category and become active, then significant savings could be realized. (BMI is a measure that refers to a person's relative weight for height.)

About the Research Company

HMA is a well-established econometrics consulting firm based in New Bern, North Carolina. During the late 1990s, it conducted chronic disease risk factor cost analyses for state health departments in North Carolina (1997) and New York (1999). More recently, it prepared similar studies for Michigan (2003), Massachusetts (2003), and Washington (2004).

For this study, HMA compiled a California corporate

health database with medical claims data representing more than 25,000 employees and adult dependents from five public and private firms employing workers throughout California representing diverse socioeconomic backgrounds. HMA data from the timeframe 1995 to 1999 were used to construct California-specific outpatient utilization and payment norms.

This Topline Report summarizes HMA's economic analysis, including the projected future costs and potential cost-savings.

The full technical report, *The Economic Costs of Physical Inactivity, Obesity, and Overweight in California Adults During the Year 2000: A Technical Analysis*, is available at www.ca5aday.com.

Direct and Indirect Costs in California of Inactivity, Obesity, and Overweight in Year 2000 (in Billions)



Costs are projected to rise to more than \$28 billion in 2005 unless aggressive action is taken.

INTRODUCTION

The 1998 California Behavioral Risk Factor Survey classifies 50 percent of adults as inactive.

Regular physical activity and healthy eating, including diets rich in fruits and vegetables, are key components of energy balance and the maintenance of appropriate weight and overall good health.⁷ Conversely, long-term sedentary lifestyles and consumption of too much high calorie, low-nutrient food result in the gradual accumulation of excess body weight. The 1998 California BRFs classifies 50 percent of adults as inactive.⁸ According to the 2001 California Dietary Practices Survey, California adults consume, on average, fewer than 4 daily servings of fruits and vegetables, well below the 5 to 9 daily servings recommended for good health.⁹ Ironically, California has tremendous resources to rectify the imbalance, not the least of which are year-round access to fresh fruits and vegetables and outdoor physical activity of all types.



Table 1. Direct, Indirect, and Total Costs for Physical Inactivity, Obesity, and Overweight in California Adults (in Year 2000 Dollars).

	Medical Care Cost ^a		Workers' Compensation Cost ^b	Lost Productivity Cost ^c		Total Cost
	Treatment	Cost of Prescription Drugs		Absenteeism, Presenteeism, and Short-term Disability	On-the-job Injury	
Physical Inactivity						
Direct	\$241,985,581	\$1,065,943,038	\$50,005,040	\$7,528,629,764	\$274,983,844	\$9,161,574,267
Indirect	\$725,956,744	\$3,197,829,114	\$200,020,159	0	0	\$4,123,806,017
Total Physical Inactivity Cost						\$13,285,353,284
Obesity						
Direct	\$135,520,641	\$595,514,095	\$17,658,344	\$3,364,013,159	0	\$4,112,706,239
Indirect	\$406,561,922	\$1,786,542,286	\$70,633,376	0	0	\$2,263,737,584
Total Obesity Cost						\$6,376,443,823
Overweight						
Direct	\$93,509,242	\$410,605,609	0	0	0	\$504,114,851
Indirect	\$280,527,726	\$1,231,816,827	0	0	0	\$1,512,344,553
Total Overweight Cost						\$2,016,459,404
Total Cost of Physical Inactivity, Obesity, and Overweight						\$21,678,256,511

^a The ratio of indirect costs to direct costs for various medical conditions is approximately 6:1 based on a range of 1.2:1 (low) to 1.5:1 (high). A conservative ratio of 3:1 was applied.¹⁰ | ^b A multiplier of 4 was used; the ratio of indirect to direct costs associated with workers' compensation costs is generally higher than medical care expenses due to the odds that extraneous circumstances will delay and/or impair an individual's return-to-work timeframe and on-the-job performance, [e.g., adjudication, poor worker attitude, return to work policy, etc.]¹² | ^c Indirect costs are not applicable since lost productivity measures are inherently classified as direct costs.

SCOPE OF THE STUDY

This statewide analysis is based on a cost appraisal framework that includes three risk factors: physical inactivity; obesity; and overweight; as well as three major types of cost units: medical care; workers' compensation; and lost productivity. Medical care cost data include inpatient-based employer- and privately-paid charges provided by the California Office of Statewide Health Planning and Development (OSHPD), outpatient-based employer- and privately-paid charges from the HMA California corporate data base, and both inpatient and outpatient claims paid by DHS through the Medi-Cal Program. The conservative ratio of 3:1 was applied for indirect to direct costs.¹⁰

Workers' compensation costs were based on data obtained from HMA's California corporate database, the Workers' Compensation Research Institute, and the 2001 Official Disability Manual published by the Work Loss Data Institute.¹² A multiplier of four was used to calculate indirect to direct costs.¹¹

Lost productivity included short-term disability days associated with the targeted medical conditions listed in Table 2, absenteeism and "presenteeism" (working, but not at full capacity) rates associated with physical inactivity and obesity based on United States worksite case studies, and wage and salary data from the California Employment Development Department. Indirect costs are not applicable since lost productivity is inherently classified as a direct cost.

Obesity and physical inactivity are independent risk factors or aggravating agents for specific

medically diagnosed conditions that incur health care expenditures, and overweight is a precursor to obesity. To determine the proportion of each medical condition claim associated with obesity and physical inactivity, a customized Proportionate Risk Factor Cost Appraisal™ (PRFCA) was constructed for California. Because it is based on medical codes that exist only for physical inactivity and obesity, overweight costs were not included in this portion of the analysis and were calculated later. PRFCA is based on the risk factor prevalence in California, the total value of inpatient and outpatient claims and charges for each diagnosis in California, and the probability that an individual will experience a specific illness or condition. Risk factor weights are subject to change as new scientific evidence evolves or health care utilization patterns change. (See Appendix A for more explanation of the PRFCA methodology.)

This report estimates the total cost of obesity in California at \$6.38 billion in year 2000 dollars. A recent study by RTI International and CDC estimated that in 2003 California's adult obesity-attributable medical expenditures were \$7.68 billion.³ Although the dollar amounts are similar, the studies use different methods and measure different costs. For example, the HMA study includes costs for 11 medical conditions, while the RTI model counts all medical expenditures. HMA includes both direct and indirect costs, while the RTI estimate is for direct costs only, including Medicare. (See Appendix B for further methodological comparisons.)

According to the 2001 California Dietary Practices Survey, California adults consume, on average, fewer than 4 daily servings of fruits and vegetables. Californians who are physically active, or are at a healthy weight eat more fruits and vegetables.⁹

Table 2. 2000 Medical Care Treatment Costs For Various Medical Conditions in California.^a

Medical Condition	Physical Inactivity Cost ^b	Obesity Cost ^b	All Medical Costs	Physical Inactivity as % of Total	Obesity as % of Total
Circulatory	\$93.7	\$46.9	\$2074.6	4.5 %	2.3 %
Cancer	\$26.8	\$13.0	\$255.1	10.5 %	5.1 %
Diabetes/Gout/Impaired Immune Response	\$32.0	\$21.9	\$452.7	7.1 %	4.8 %
Mental Health	\$64.8	0	\$727.9	8.9 %	0 %
Musculoskeletal	\$10.9	\$3.8	\$350.7	3.1 %	1.1 %
Neurological	\$3.4	\$1.6	\$17.8	19.1 %	9.0 %
Pregnancy	0	\$9.6	\$552.4	0 %	1.7 %
Digestive and Renal	0	\$28.4	\$1026.4	0 %	2.8 %
Signs/Symptoms/(Ill-defined)	\$10.5	\$10.3	\$720.8	1.5 %	1.4 %
Total	\$242.1	\$135.5	\$6178.4	3.9 %	2.2 %

^a Cost in Millions | ^b Values from Tables 6–14 from the technical report were multiplied by an inflator of 1.0325 to adjust costs to 2000 amounts.⁶

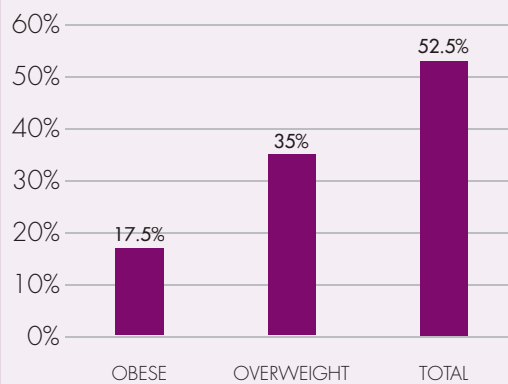
DEFINITIONS AND MEDICAL CARE COSTS OF TARGETED RISK FACTORS

Physical Inactivity

HMA used 1998 California BRFSS data to define physical inactivity as, “No leisure time physical activity in the past month or irregular physical activity (less than 3 times per week or less than 20 minutes per session) in the past month.” The BRFSS analysis indicated that 49.5 percent of adults were physically inactive.⁸ Many medical conditions, such as heart attack, various forms of cancer, depression, and carpal tunnel syndrome, are more likely to occur in individuals who are physically inactive.¹³ PRFCA was used to quantify the percentage of direct costs attributable to physical inactivity.

Physical inactivity was associated as a risk factor in 3.9 percent of California direct medical care treatment costs, or \$242 million for all of the causes listed on Table 2. For every dollar spent on primary medical care treatment in 2000, almost four cents was attributable to physical inactivity. Thus, the impact of physical inactivity on direct medical care treatment costs was substantial.

Rates of Obese and Overweight Adults in California



Obesity and Overweight

Obesity and overweight status is approximated based on BMI. The BMI calculations are: weight (kg)/height(m²) –or– [weight (lbs.)/height (inches²)] x 703. Overweight is defined as having a BMI from 25.0 to 29.9. Obesity is defined as a BMI from 30.0 to 39.9. Extreme obesity is defined as a BMI greater than 40.0.¹⁴

In 1999, it was estimated that 35 percent of California adults were overweight, while another 17.5 percent were obese.¹⁵ The combined rates for overweight and obesity in the state totaled 52.5 percent. Obesity was cited as a risk factor for nearly every medical condition listed on Table 2. Direct costs of medical care treatment associated with obesity were 2.2 percent of costs for all causes, or \$135.5 million in 2000.

Although overweight is a precursor to obesity, it was neither independently classified nor included in the PRFCA calculations because separate risk factor weights have not been well-established in the economic literature. A composite risk factor ratio of .69 was used by HMA in relation to the obesity figures to calculate the approximate medical care costs incurred by the overweight sector. An estimated 1.5 percent of treatment costs for all medical conditions on Table 2, or \$93 million, were attributable to overweight. The overall impact of obesity and overweight on primary medical care treatment costs was 3.7 percent, or approximately four cents for every dollar spent in 2000.

Combined Costs of Physical Inactivity, Obesity, and Overweight

Total direct medical care treatment costs of almost \$6.2 billion were calculated for California in 2000 based on Medi-Cal claims and payments, charge data from OSHPD, and estimates based on HMA's database of California private- and public-sector work sites.

Total direct medical care treatment costs of almost \$6.2 billion were calculated for California in 2000. About 3.9 percent of these costs were attributable to physical inactivity, while the overall impact of obesity and overweight on primary medical care treatment costs was 3.7 percent. Collectively, costs due to physical inactivity, obesity, and overweight totaled 7.6 percent, or almost eight cents for every dollar spent in 2000.

Prescription Drugs

Only publicly-funded prescription drug costs were available. Pharmaceutical drug costs were provided by DHS for the Medi-Cal population by specific International Classification of Diseases-9 (ICD-9) codes relevant to obesity and physical inactivity. The prescription drug costs were tabulated for the 12-month period of July 1, 1999, to June 30, 2000, for fee-for-service eligibles. Baseline data were used to estimate the prescription drug costs associated with obesity and physical inactivity for managed care clients and all California adults. Assuming that the total payments for prescription drugs tied to targeted ICDs and Diagnostic Related Groups (DRG) are similar to the same ICDs and DRGs payments for medical care, it is possible to estimate pharmaceutical costs attributable to these risk factors, individually and collectively. The total of direct costs for prescription drugs for the three risk factors was estimated at just over \$2 billion in 2000.

Workers' Compensation Costs

Nationally, most workers' compensation claims have a musculoskeletal origin, and 46 percent of these claims are sprains and strains commonly associated with cumulative trauma disorders (CTDs). Because of the volume of these types of injuries, CTDs are among the most costly work-related conditions, yet they are preventable. Based on data from HMA's



California corporate database and the 2001 Official Disability Guidelines,¹² 2 of every 100 workers experience sprains or strains on the job each year. The most recent data available from the Workers' Compensation Research Institute in 1996 estimate the average charge for a workers' compensation claim at \$4,560. After adjusting to 2000 dollars, workers' compensation direct costs related to musculoskeletal ailments are \$50 million for physical inactivity and \$17.7 million for obesity, for a total of nearly \$68 million in direct costs alone. Factoring in the indirect costs, the total cost estimate for workers' compensation claims is \$338 million.

The direct costs for prescription drugs for all three risk factors was estimated at just over \$2 billion in 2000.

PROJECTED COSTS AND POTENTIAL COST-SAVINGS

If 1 or 2 out of every 20 sedentary and/or overweight Californians were to become more physically active and reduce their BMI to a leaner category, then California could realize significant savings of about \$1.3 billion per year, or almost \$6.4 billion in five years.

Lost Productivity

When measuring the costs of lost productivity, most analysts look only at direct medical costs. Others consider indirect costs but focus strictly on absenteeism and disability. Recently “presenteeism” has been added to the productivity equation. It is defined as, “productivity loss that occurs when workers are on the job but not fully functioning.”¹⁶ Absenteeism, short-term disability, and presenteeism yield a far more accurate picture of lost productivity. Formulas used to compute the costs of each lost productivity outcome measure were based on composite data, on average annual hours lost per worker, derived from the 2001 Official Disability Guidelines,¹² HMAs database of California workers, and worksite profiles described in the professional literature. Using aggregate data, the average annual number of hours lost per worker was assigned to each measure.

The costs of inactivity, obesity, and overweight in California are certain to increase due to population growth, aging, high prevalence of physical inactivity and obesity, and medical inflation. If medical care costs continue to rise at least seven percent a year, workers’ compensation costs continue to rise at nearly five percent per year, and employment cost index components also continue to rise by almost five percent, then physical inactivity- and obesity-related costs will increase from \$21.68 billion in 2000 to more than \$28 billion in 2005. This would be a cumulative increase of 32 percent in just five years.

Alternatively, if the percentage of adults who were physically inactive (49.5 percent in 1998) and overweight (35.0 percent) and obese (17.5 percent in 1999) could be reduced in the range of five to ten percent, the statewide financial toll could be considerably reduced. A five percent increase in the percentage of physically active and leaner adults could produce cost savings benefits of about \$1.3 billion per year, or almost \$6.4 billion in five years, while a ten percent increase would avoid nearly \$13 billion in direct and indirect medical costs. That is, if 1 or 2 out of every 20 sedentary and/or overweight Californians were to become more physically active and reduce their BMI to a leaner category, then California could realize significant savings.



The total lost productivity cost relevant to physical inactivity is nearly \$7.5 billion, and the cost of obesity is approximately \$3.4 billion. On average, a staggering three weeks or more per year of lost productivity can be attributed to the designated risk factors, over 50 percent more time than the average 14.2 days vacation and holiday leave that United States private sector employees averaged in 2000.¹⁷ Lost-time injuries that occurred at work were calculated separately and accounted for an additional \$275 million per year.

The Bottom Line

The total costs of physical inactivity, obesity, and overweight in California was estimated at \$21.68 billion in 2000. Of this burden, approximately \$3 billion is shouldered by federal, state, and local government to cover their respective workforces. (See Appendix C.)

STUDY LIMITATIONS AND PRECAUTIONS

Although extensive efforts were made to acquire specific types of data, some data do not exist in the desired format, at the level of accuracy, or the degree of completeness needed. Thus, these figures should be viewed as estimates with the following limitations and precautions.



- The prevalence rates of physical inactivity, overweight, and obesity were averages of the entire California population; rates are known to be higher in certain ethnic, low-income, and lower education groups. Obesity rates were self-reported; measured rates may be as much as ten percentage points higher.
- The risk factor weights were determined after review of several sources and pertain only to the general adult population; prevalence is known to be higher in certain ethnic, low-income, and lower education groups. Risk factor weights also may change with new scientific evidence or patterns of health care use.
- Some cost data were not available. These included Medi-Cal managed care for which a multiplier was substituted, billed (real) Medi-Cal costs for which a proxy measure of payments was used, and pharmaceutical drugs paid by private- and employer-paid sources.
- Multiple sources were consulted to derive conservative median and average estimates for some components associated with workers' compensation, lost productivity, and on-the-job injury costs.

- Similarly, multiple sources were used to estimate the indirect costs of physical inactivity, obesity, and overweight. Cost estimates for overweight, unlike obesity, have not been established for most medical conditions in the economic research literature.
- While health care costs associated with physical inactivity, obesity, and overweight are incurred by young people, data sources related to prevalence rates and risk factor weights for persons under age 20 years are unreliable.
- Costs associated with poor diet in normal weight or physically active persons were not included in this economic model. As yet, no such model is available.

Therefore, it is reasonable to state that the costs listed in this report are conservative and may underestimate the actual total costs of physical inactivity, obesity, and overweight in California adults.

A copy of the full technical report: *The Economic Costs of Physical Inactivity, Obesity, and Overweight in California Adults During the Year 2000: A Technical Analysis*, can be found at www.ca5aday.com.

The costs listed in this report are conservative and may underestimate the actual total costs of physical inactivity, obesity, and overweight in California adults.

APPENDIX A

Proportional Risk Factor Cost Appraisal

When the field of prospective medicine was conceived in the early 1960s, there was virtually nothing to guide data analysts in calculating the costs of major risk factors. Eventually, the traditional model of risk-factor influence was born and provided data analysts with a relative understanding of how lifestyle, environmental, genetic, and health care factors can influence a person's health status. Yet, in most cases, it was customary to link major risk factors to a single influence, such as obesity, with lifestyle.

Eventually, this one-to-one (unilateral) concept gave way to a more contemporary concept known as multi-risk factor causation, which is based on the premise that many illnesses and diseases are often caused by multiple risk factors across the lifestyle, genetic, environmental, and health care spectrum. For example, musculoskeletal claims are one of the most common and expensive claims at many worksites; low back pain is particularly common. Research suggests the following risk factors cause and/or contribute to low back pain and other low back injuries:

- Age (over 35 years of age)
- Obesity
- Medical history
- No pre-work stretch
- Cigarette smoking
- No job rotation
- High stress
- Low work satisfaction
- Repetitive motion
- Physical inactivity
- Heavy labor
- Gender*

* Some research indicates that females are more likely to report low back pain earlier than males; yet, males tend to postpone reporting a low back episode until it becomes severe and more debilitating.

Proportional Risk Factor Cost Appraisal is a trademarked property owned by HMA.

One simple way to calculate the cost of each risk factor is to use an Equitable Risk Factor Weight Method as shown below:

ICD: Low back pain

$$\begin{array}{rcccccc} \text{Total Cost of Illness} & & \text{divided by} & & \text{\# of risk factors} & & = & & \text{individual risk factor cost} \\ \\ \$200,000 & & \div & & 12 & & = & & \$16,666 \end{array}$$

As you can see, the equitable risk factor weight method has several limitations, most notably it is based on the premise that each risk factor has the same (equal) level of influence; yet, epidemiological studies conducted in public health and worksite settings clearly show that *no two risk factors have the same influence* on a person's predisposition for low back injuries or any other illness or disability. Thus, to account for this influential difference, risk factor costing calculations should incorporate techniques such as PRFCA.

Methodologically, PRFCA incorporates specific risk factors linked to lifestyle, environment, genetics, and health care forces with realistic risk factor weights. Moreover, PRFCA accounts for the percentage of employees and dependents with specific risk factors and distinguishes between inpatient vs. outpatient claims and costs. This accountability is essential because:

- Outpatient claims are far more common than inpatient claims
- Inpatient claims, on average, are significantly more expensive than outpatient costs

- A contamination effect will occur if all claims and costs are bundled together by artificially inflating or deflating the actual composite (adjusted) cost that is used in the PRFCA calculation

Most employers receive their claims data formatted by Major Diagnostic Categories (MDCs). Depending on the formatting practices of an insurer or claims administrator, the scope of claims reports provided to an employer may range from 17 MDCs to as many as 25 different MDCs. In any case, the standard MDCs are:

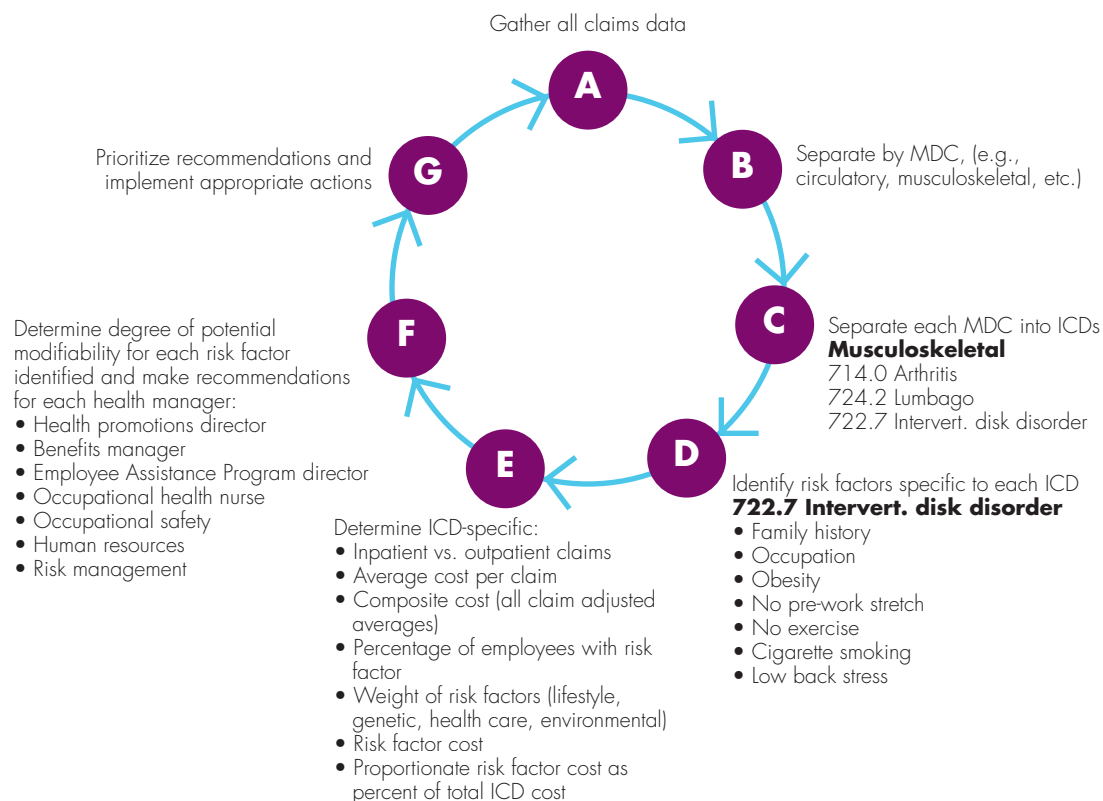
- | | |
|-------------------------------------|------------------------------|
| • Blood-related | • Miscellaneous ^a |
| • Circulatory | • Mental ^b |
| • Congenital | • Musculoskeletal |
| • Digestive | • Neoplasm (cancer) |
| • Ear/nose/throat | • Nervous |
| • Endocrine/nutrition/metabolic | • Pregnancy ^c |
| • Factors influencing health status | • Respiratory |
| • Genito-urinary | • Signs/symptoms/ill-defined |
| • Injury and poisoning | • Skin/subcutaneous |

^a Usually a mixture of claims from various MDCs that were, for various reasons, classified in this category.

^b Often divided into one or more of the following subcategories: *Substance Abuse, Alcohol, or Drug-related*.

^c Often divided into one or more of the following subcategories: *Prenatal, Neonatal, or Post-natal*.

Figure 1: The Proportionate Risk Factor Cost Appraisal (PRFCA) Framework



APPENDIX B

Other Estimates Of Obesity-Attributable Health Care Costs

The first nationwide study of state-level obesity-attributable medical expenditures was published in early 2004.³ This chart compares the special analysis for California led by Dr. Chenoweth of HMA with the national study conducted by Dr. Finkelstein and colleagues of Research Triangle Institute and the Centers for Disease Control and Prevention.

	Chenoweth, 2004	Finkelstein, et al. 2004
Time frame of estimated cost	Year 2000 dollars; projections to 2005	Year 2003 dollars; no projections
Risk Factors included	Physical inactivity, obesity, overweight	Obesity only
Costs attributable to the risk factors in California (in billions)	Physical inactivity — \$13.29 Obesity — \$6.38 Overweight — \$2.02	Obesity — \$7.68
Diseases attributed to risk factors	Study looked at medical expenditures related to 11 specific medical conditions: Type 2 diabetes, coronary heart disease, hypertension, gallbladder disease, breast cancer, endometrial cancer, colon cancer, osteoarthritis, mental health, pregnancy, and musculoskeletal conditions	Study looked at total medical expenditures, not by disease entity
BMI cutpoint(s)	Obesity = BMI \geq 30 Overweight = BMI \geq 25 < 30	Obesity = BMI \geq 30
Study sample	3.7 million actual medical care claims and charges incurred in 1999 by the vast majority of California adults	Self-reported data — 1998 Medical Expenditure Panel Survey linked to the 1996 and 1997 National Health Interview Survey for 10,128 adults with complete data for both expenditures and height/weight — weighted to be a nationally representative sample
To get state-level estimates of physical inactivity, obesity, and/or overweight prevalence	One year of data from the California BRFSS — self-reported weight and height from 4,149 people in 1999 and physical activity pattern from 4,045 people in 1998	Three years of pooled data (1998-2000) from the nationwide BRFSS for 398,446 adults — self-reported height, weight, and socio-demographic characteristics
Direct cost data source — Inpatient medical care costs, employer/private pay	Inpatient employer and private pay charges and costs (1999) provided by OSHPD from patient discharge tapes	1998 Medical Expenditure Panel Survey — Total annual medical expenditures for each individual; percentage of expenditures covered by non-public, third-party payers
Direct cost data source — Outpatient, medical care costs, employer/private pay	Outpatient claims and costs estimated from HMA's California corporate health database	1998 Medical Expenditure Panel Survey — Total annual medical expenditures for each individual; percentage of expenditures covered by non-public, third-party payers
Direct cost data source — Inpatient and outpatient public pay	Inpatient and outpatient claims and costs for 2,554,444 eligible people Medi-Cal, July 1, 1999 – June 30, 2000	Percentage of expenditures covered by the third-party payers, Medicare, and Medicaid
Public pay data source omissions	<ul style="list-style-type: none"> Managed care Medi-Cal recipient data imputed using factor of 1.25 fee-for-service information Medicare not included 	Uninsured not represented (Insurance expenditures only)
Indirect cost components	<ul style="list-style-type: none"> Workers' compensation (including legal and administrative indirect costs) Lost productivity Cost related to inefficiencies on the job after returning to work 	Not presented in this study
Lost productivity and workers' compensation data source	California-specific data provided by the California Department of Commerce and the 2001 Official Disability Guidelines to derive annual earnings, musculoskeletal injury prevalence, and days lost to various disabling conditions; California specific workers' compensation claims and reimbursement rates	Not presented in this study

APPENDIX C

Estimated Year 2000 Cost to Government Employers of Physical Inactivity, Obesity, and Overweight

Workforce data presented here are based on the Employment Development Department State of California Historical Employment records, for January 2000. ([http://www.calmis.ca.gov/file/indhist/cal\\$hws-1990.xls](http://www.calmis.ca.gov/file/indhist/cal$hws-1990.xls)). The data are not adjusted for seasonality because the adjusted data present only entire categories (e.g., "Government") and do not break down the government category into federal, state, and local entities.

California Labor Force, March 2000	
California Labor Force	
Total Civilian Labor Force ¹	16,554,300
Government Employment	2,282,300
Federal	265,100
Department of Defense	62,300
Other Departments	202,800
State ²	431,500
State Government Education	190,600
Other State Government	240,900
Local	1,585,700
Local Government Education	916,100
County	308,000
City	245,300
Special Districts	99,100
Indian Tribes	17,200

¹ The Total Civilian Labor Force includes self-employed individuals, unpaid family workers, household domestic workers, and workers on strike.

² This estimate does not include state universities, because the employee figure specifically for that sector is not readily extracted from the total 112,400 employees categorized as "colleges, universities, and professional schools."

To determine the percent of total California employees who are government employees, we used the Total Industry Workforce and the total federal, state, and local government rows as shown below to get estimates of the percentage of all employees who work for different levels of government.

Federal Government Employees		Total Civilian Labor Force		Multiplying Factor
265,100	÷	16,554,300	=	.016
State Government Employees		Total Civilian Labor Force		Multiplying Factor
431,500	÷	16,554,300	=	.026
Local Government Employees		Total Civilian Labor Force		Multiplying Factor
1,585,700	÷	16,554,300	=	.096

The cost of physical inactivity, obesity, and overweight for each level of government was calculated using the corresponding multiplying factors above as well as the total cost of physical inactivity, obesity, and overweight for all Californians presented in Table 1.

	Total for all California	Federal Government Employees	State Government Employees	Local Government Employees	Total Government
Physical Inactivity, Obesity, and Overweight Costs	\$21,678,256,511	\$347,154,866	\$565,059,694	\$2,076,512,528	\$2,988,727,088

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Topline Report

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